Compenium of Aquatic Toxicity Studies in Canada

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COMPENDIUM OF AQUATIC TOXICITY STUDIES IN CANADA

Presented at the Aquatic Toxicity
Coordination Workshop
Freshwater Institute, Winnipeg
August, 1974

TABLE OF CONTENTS

	Page
EPS, Halifax	1
F&MS, Halifax	3
Noranda Research Centre, Quebec	4
Sir George Williams University, Montreal	5
Ontario MOE	7
Beak Consultants Limited	9
University of Toronto	11
University of Guelph	12
J. B. Sprague Associates Limited	13
Pollutech Pollution Advisory Services Limited	14
Wastewater Technical Centre; CCIW, Burlington	16
Biolimnology Laboratory; CCIW, Burlington	18
Enviroclean Limited	21
F&MS Operations, FWI, Winnipeg	22
F&MS Research, FWI, Winnipeg	23
EPS, Edmonton	27
International Pacific Salmon Fisheries Commission	28
EPS, Vancouver	30
Pacific Environment Institute, Vancouver	31
B. C. Research	34
Pacific Biological Station, Nanaimo	36
B. C. Pollution Control Branch	38
EPS, Yellowknife	39

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Environmental Protection Service
Atlantic Region
Box 2406
Halifax, Nova Scotia
B3J 3E4

Telephone Numbers:
(902) - 426-4161
426-3288

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

E. PESSAH
P. Wells
R. Parker
J. Schneider
D. Vaughan
K. Doe
G. Harris

Activities (list toxicity studies [past, present, future] undertaken by this lab):

Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
	RAINBOW TROUT	
	KILLIFISH	
	ATLANTIC SALMON	
	LOBSTER LARVAE	
	SAND SMELT	

* please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study
(see attached example sheet) (use another page if necessary)

ACTIVITIES:

WASTE/CONTAMINANT TESTED

Product testing (including oil dispersants, dyes, detergents, etc.)

Industrial effluents (including routine monitoring of effluents from about 100 industrial sites).

Simulated industrial effluents (metal plating, textile, oil refinery, etc.)

Pure chemical testing. (A reference book of relative toxicities to rainbow trout involving a single test methodology is being prepared.) Over 35 entries have been made to date.

Waste treatment efficiency studies (pulp and paper, mining, textile).

Acclimation of fingerling rainbow trout (<1g. to 6g) to saline solutions).

BIOASSAY TYPE

Lethal-flow through, lethan-static; LT50 and LC50 determinations.

Routine sublethal testing using respiration , blood (physical parameters and osmolality) and histological measurements are being planned.

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Resource Development Branch
Water Quality Unit
Fisheries and Marine Service
Box 550
HALIFAX, Nova Scotia

902 - 426-2719

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

W. Watt
G. Farmer
S. Ray

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
Present	heavy metals	Atlantic Salmon	sublethal-flow through - examining sublethal effects on salmon growth and bio-energetics - selective accumulation and excretion in fish - speciation of toxic components of metals

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* *please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study*

(see attached example sheet) *(use another page if necessary)*

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Noranda Research Centre
240 Hymus Boulevard
Pointe-Claire, Quebec H9R 1G5
(514) 697-6640

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

Dr. Claude E. Delisle
Douglas J. Allan
Louis P. Cullen

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
Past	Mine Effluent (Cu)	Salmon smolts and aquatic insects (Plecoptera)	In situ (Impact-field study)
Future	Fertilizer Effluent (PO_4 & F)	Lobster larvae and crabs (rock)	Impact-field study
Past	Smelter Effluent (Pb - Zn)	Lobster larvae	Impact-field study
Present	Sediments (marine)	Goldfish and bottom catfish (Plecastomus)	Sublethal (long-term bio-accumulation from contaminated sediments with heavy metals

* please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study

(see attached example sheet) (use another page if necessary)

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Department of Biological Sciences
Water Pollution Research Laboratory
Sir George Williams University
Montreal
514-879-4402 or 879-5989

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

G. LEDUC, Associate Professor
P. Anderson, Assistant Professor
S. Ruby, Assistant Professor
H. Ruber, Research Associate
M. Webb, Research Associate

5 graduate students

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
Past	Methoxychlor	Brook trout	sublethal in diet examining effects on growth, swimming, food maintenance requirements, histopathology, residues
	Cyanide	Rainbow trout	sublethal, effect on osmoregulation
Present	Cyanide	Rainbow trout	sublethal, effects on growth, respiration, swimming, oogenesis, spermatogenesis, histopathology
	Arsenic-Cyanide	Rainbow trout	sublethal effects on growth, swimming, respiration, residues
	Mine floatation reagents	Rainbow	lethal flow through sublethal effects on growth, swimming, histopathology

* *please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study*

(see attached example sheet) *(use another page if necessary)*

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Future	Mine floatation reagents	Rainbow trout	lethal flow through effects of size
		Invertebrates	lethal flow through, sublethal
	Multiple toxicants	t.b.a.	lethal flow through and sublethal
	Cyanide	t.b.a.	sublethal effects on tissues and populations study in laboratory model ecosystem

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Ontario Ministry of the Environment
Toxicity Unit
Limnology & Toxicity Section
Water Resources Branch
Box 213
REXDALE, Ontario M94 5L1
(416) - 248-3011

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

R. G. V. BOELENS (Biologist-in-Charge)
C. INNISS (Senior laboratory technician)
G. Craig D. Wells
K. Suns M. Whittle

Activities (list toxicity studies [past, present, future] undertaken by this lab):

Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
Fungicides	Fathead Minnows	Lethal-Static
Herbicides	" "	" "
Insecticides	" "	" "
Oil Dispersants	" "	" "
Defoamers	Fathead Minnows + guppies, flagfish	" "
Molluscicides	Fathead Minnows + leeches	" "
Metallic Salts	Fathead Minnows + rainbow trout	" "
Acids & Bases	Fathead Minnows + perch, lake trout, bass	Lethal Flow-through
Toxic Spills'	Fathead Minnows + guppies	Lethal-Static
Refinery Wastes	Rainbow trout	Impact-field study
Mining Wastes	Perch	" " "
Plating Wastes	Fathead Minnows	Lethal-Static
Pulp & Paper	Fathead Minnows + trout	Impact-field study
Petrochemical Wastes	Rainbow Trout	" " "

.../ cont'd

* please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study

(see attached example sheet) (use another page if necessary)

INFORMATION SHEET: Cont'd

Ontario Ministry of the Environment
Water Resources Branch
REXDALE, Ontario

Activities: Cont'd

Waste/Contaminant Tested	*Test Organism(s)*	*Bioassay Type*
Mercury	Rainbow trout, sunfish rockbass	Uptake-flow through
Miscellaneous	Amphipods, mayfly larvae, snails, daphnia	Lethal-Static and flow

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Beak Consultants Limited
306 Rexdale Blvd.
Suite 3
Rexdale, Ontario M9W 1R6

Telephone: (416) 743-9000

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

D. STONE
F. K. FAHMY
D. L. Lush F. Strean
V. S. Gaind
R. T. Fraser

Activities (list toxicity studies [past, present, future] undertaken by this lab):

Waste/Contaminant Tested	*Test Organism(s)*	*Bioassay Type* *
Pulp and paper effluents	rainbow trout - yellow perch brown trout invertebrates (including egg and larval stages)	lethal - flow through lethal - static sublethal - life cycle impact - field study
Mining effluents	rainbow trout invertebrates	lethal - flow through lethal - static impact - field study
Chemical industries effluents	rainbow trout invertebrates	lethal - flow through lethal - static impact - field study
Oil refinery effluents	rainbow trout invertebrates micro-organisms	lethal - flow through lethal - static sublethal - respiration impact - field study

.....cont'd

* *please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study*
(see attached example sheet) *(use another page if necessary)*

Waste/Contaminant Tested	Test Organism(s)	Bioassay Type
Oil dispersants	rainbow trout	lethal - flow through lethal - static
Oil drilling fluids	rainbow trout	lethal - flow through lethal - static sublethal - respiration
Process chemicals	rainbow trout stickleback	lethal - flow through lethal - static

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Botany Department, University of Toronto 928-6442
Zoology Department, University of Toronto 928-7141
Institute for Environmental Studies, U. of T. 928-6526

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

T.C. HUTCHINSON	928-6526	M. Hilgerdenaar
P. STOKES	928-7141	V. Zobens
J. HELLEBUST	928-3540	T. Lin
F. FRY	928-3505	

Activities (list toxicity studies [past, present, future] undertaken by this lab):

Waste/Contaminant Tested	*Test Organism(s)*	*Bioassay Type* *
Heavy metals in lake waters and streams e.g. Cu,Ni,Pb,Cd,Hg, Ag,Sb,Sn,V,Zn,Cr, and Co.	Unicellular algae e.g. Chlorella, Scenedesmus Chlamydomonas, etc. + floating aquatics e.g. duckweeds, etc.	Sub-lethal growth, photosynthesis uptake
Nutrients in lakes N & P		Also for impact-field study
Crude oil and aqueous extracts of components		

* *please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study*

(see attached example sheet) *(use another page if necessary)*

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Department of Zoology
College of Biological Sciences
University of Guelph
Guelph, Ontario
Canada. Telephone (519) 824-4120

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

Dr. F.W.H. Beamish
Patrick Lett (graduate student)
Ken Waiwood (graduate student)
R. Scott Howarth (grad. student)
Dr. J.B. Sprague
Peter G. Wells (grad. student)
William Logan (" ")
Bruce A. Barton (" ")

Activities (list toxicity studies [past, present, future] undertaken by this lab):

Waste/Contaminant Tested	*Test Organism(s)*	*Bioassay Type* *
Copper	Rainbow trout	-Sublethal effects on swimming ability and respiration, and growth efficiency, at differen levels of hardness and pH.
"	"	-Acute lethality at diff. level of hardness, pH
Drilling fluids and mine wastes	"	-Acute lethality of mixed components.
Crude oil	Lobster larvae	-Acute lethality and effects on growth and development.
Suspended solids	Stream ecosystems	-Effects of highway constructio
Various toxicants	Rainbow trout, flagfish, others	-Suitability of small tropical fish for bioassays; relative sensitivity compared to trout.
past:		
Zinc	Atlantic salmon, rainbow trout.	-Effect of temperature on acute lethality and mechanism of poisoning.

* *please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study*

(see attached example sheet) *(use another page if necessary)*

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

J.B. SPRAGUE ASSOCIATES LTD.
166 Maple Street
Guelph, Ontario
N1G 2G7
Canada

Telephone (519) 824-8329

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

Dr. John B. Sprague

Dr. Donald L. Rowe (Scientist-in-charge, refinery waste project)

Mr. Kenneth Flood

Activities (list toxicity studies [past, present, future] undertaken by this lab):

Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
present:		
Oil refinery waste	trout flagfish crustaceans	Sublethal effects, growth, reproduction, etc.
future:		
Pulp mill effluent etc.	fish	Capability for monitoring acute lethality, or research on selected sublethal effects.

* please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study

(see attached example sheet) (use another page if necessary)

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

POLLUTECH POLLUTION ADVISORY SERVICES LIMITED

OAKVILLE	VANCOUVER
1094 Speers Road	104 Charles Street
Oakville, Ontario	North Vancouver, British Columbia
L6L 2X4	
(416) 844-1900	(604) 929-2435

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

Oakville Laboratory - Mr. D. CASSON
Vancouver Laboratory - Mr. A. W. MAYNARD

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Waste/Contaminant Tested	*Test Organism(s)*	*Bioassay Type* *
Past & Present	Bleached kraft mill effluents	rainbow trout	lethal-static
"	Sulfite mill effluents	rainbow trout	lethal-static
"	Debarker effluents	rainbow trout	lethal-static
"	Mine tailings effluents	rainbow trout	lethal-static
		coho fry	lethal-static
"	Oil refinery effluents	rainbow trout	lethal-static
"	Effluents from various chemical plants	rainbow trout	lethal-static
"	Surface runoff	rainbow trout	lethal-static
"	Textile waste	rainbow trout	lethal-static
Past	Amines	redbelly dace, golden shiner	lethal-static
Past	Kerosene	redbelly dace, golden shiner	lethal-static
Past	Dehydroabietic acid	pumpkinseed sunfish	sublethal-respiration
Past & Present	Oil refinery + chemical effluents	rainbow trout	impact-field study- flesh tainting, growth inhibition, performance, acute toxicity

* *please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study*

(see attached example sheet) *(use another page if necessary)*

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

POLLUTECH POLLUTION ADVISORY SERVICES LIMITED , Continued ...

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
Past	Mine mill effluents	rainbow trout	impact-field study
		redbelly dace, golden shiner	lethal-static
Past	Contaminated sediments	amphipods	lethal-static
		chironomids	sublethal-sediment
		mayflies	selection
Present	Effluent from car dewax plant	rainbow trout	lethal-static
Past	Garbage leachates	rainbow trout	lethal-static
Past	Oil dispersants	rainbow trout	lethal-static
Past	Crude oil	rainbow trout	lethal-static
Past	Zinc	rainbow trout	lethal-static
Past	Copper	rainbow trout	lethal-static
Past	Cyanide	rainbow trout & guppies	lethal-static
Past	Sodium pentachlorophenate	rainbow trout	lethal-static
Past	Dehydroabietic acid	rainbow trout, sunfish & guppies	lethal-static
Past	Phenol	rainbow trout	lethal-static

* please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study

(see attached example sheet) (use another page if necessary)

Waste/Contaminant Tested	Bioassay Type
Present:	
BiSulfite Waste (Treated & Untreated)	Lethal-static
Petroleum Effluents (Process streams)	Lethal-flow through Lethal-static
Kraft Bleachery Waste (Treated & Untreated)	Lethal-flow through
Future:	
Kraft Bleachery Waste (Treated & Untreated)	Lethal-flow through Lethal-static
Chlorination, ozonation of treated sewage	Lethal-flow through
Textile Wastes (Treated & Untreated)	Lethal-flow through

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Great Lakes Biolimnology Laboratory
Canada Center for Inland Waters
Box 5050, Burlington, Ontario
L7R 4AS

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

Dr. D.G.S. Wright
Ms. O. Kramar

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Waste/Contaminant Tested	*Test Organism(s)*	*Bioassay Type* *
present	Pb^{++}	Hyalella azteca	Lethal-static
present	Cd++	Daphnia pulex	Sub-lethal-flow through
future	Se++	Lymnaea stagnalis	
future	As+++	Lymnaea palustris	Lethal-flow through
		Cambarus sp.	Sub-lethal-static (eggs)
		Orconectes immunis	
		Anodonta sp.	
		Lampsilis sp.	

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(see attached example sheet) *(use another page if necessary)*

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Great Lakes Biolimnology Laboratory
Canada Center for Inland Waters
Box 5050, Burlington, Ontario
L7R 4A6

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

Dr. Paul T.S. Wong
Mrs. Lynne Luxon
Mrs. G. Burnison

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Waste/Contaminant Tested	*Test Organism(s)*	*Bioassay Type* *
Present	Pb^{2+}	Scenedesmus quadricauda	lethal-static
"	Cd^{2+}	Chlorella pyruordosa	sub-lethal-static
Future	Se^{2+}	Ankistrodesmus falcatus	
		Selenastrum capricosnatum	
"	As^{3+}	Anabaena flos-aquae	
		Nairçula pelliculosa	
		Oscillatoria sp.	

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* *please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study*

(see attached example sheet) *(use another page if necessary)*

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Great Lakes Biolimnology Laboratory
Canada Centre for Inland Waters
P.O. Box 5050
Burlington, Ontario

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

P.V. Hodson
Ms. B.R. Blunt

Activities (list toxicity studies [past, present, future] undertaken by this lab):

Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
Pb, Cd] present	Salmo gairdneri Lebistes reticulatus	lethal & sublethal flow-through
As, Se] future	will increase # of species in future.	sub-lethal will measure hematology enzymology, etc. changes.

* please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study
(see attached example sheet) (use another page if necessary)

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Enviroclean Limited
320 Adelaide Street South,
London, Ontario N5Z 3L2
(519) 432-7558

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

Dr. R. Bland
Mr. D. Troubridge

Activities (list toxicity studies [past, present, future] undertaken by this lab):

Waste/Contaminant Tested	*Test Organism(s)*	*Bioassay Type* *
Petrochemical Effluents (past and future)	Fathead Minnow Rainbow trout	Lethal-static
Contaminated Lake Sediments (past)	Rainbow Trout	Lethal-static
Boron Assays (Present and future)	Algae	Sub-lethal limiting concentrations for growth

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* *please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study*
(see attached example sheet) *(use another page if necessary)*

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Freshwater Institute
Aquatic Toxic Studies Division
501 University Crescent, Winnipeg
(204) 269-7379 Ext. 379

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

D. G. ALEXANDER
B. Chu
H. Maciorowski
J. Rudolph
K. Supeene

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Water/Contaminant Tested	Test Organism(s)	Bioassay Type*
Past	mining effluent	rainbow trout & amphipods	lethal-flow through
Present	tritiated water	" "	lethal-static
	primary & secondary treated sewage	" "	lethal-flow through
	oil refinery effluent	" "	lethal-flow through
Future	textile waste	" " "	lethal-flow through
	2° sewage effluent, textile waste, food processing & allied waste. Alkaline & Associated products waste & pesticides.	" " " testing the effect of several of the above effluents on whitefish, walleye, and Arctic Char.	lethal-flow through Determining the sub-lethal effects of each effluent by means of swimming performance, avoidance behaviour & eventually growth & reproduction studies.

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* *please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study (see attached example sheet) (use another page if necessary)*

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Freshwater Institute
501 University Crescent
WINNIPEG, Manitoba

269-7379

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

W. L. Lockhart
D. A. Metner

and others in cooperative studies ie.

B. Graham
R. Wagemann
G. R. B. Webster
N. Grift
A. Lutz
R. Hunt
J. Solomon etc. etc.

Activities (list toxicity studies [past, present, future] undertaken by this lab):

Waste/Contaminant Tested	*Test Organism(s)*	*Bioassay Type* *
DDE	Rainbow trout adults	Sublethal (biochemistry) & residue of toxicant
Sencor	"	"
IMOL-S-140	"	Sublethal (biochemistry) (no residues for IMOL)
Fenitrothion	"	Sublethal (biochemistry) & residue of toxicant & impact field
Methoxychlor	White sucker adults	Lethal, flow-through & residue

* *please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study*

(see attached example sheet) *(use another page if necessary)*

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Freshwater Institute
Research and Development Directorate
501 University Crescent
WINNIPEG, Manitoba
R3T 2N6
204 - 269-7379 Ext. 242.

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):
D. M. Rosenberg
N. B. Snow
A. P. Wiens
P. Chang
M. Van Det
B. Phillips
P. Stewart

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
past/ present	crude oil	benthic community (stream)	impact-field study*
past/ present	crude oil	benthic community (lake)	impact-field study*
past/ present	sediment	benthic community (stream)	impact-field study*
future	sediment	benthic community (stream)	impact-field study*
future	crude oil crude oil dispersants	*Pontoporeia affinis* *Mesidotea entomon* *Mysis relicta* *Neomysis mercedis*	sublethal static (choice chamber)

* whole ecosystem and artificial substrate

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* please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study

(see attached example sheet) (use another page if necessary)

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Freshwater Institute
501 University Crescent
Winnipeg, Manitoba
269-7379 (145)

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

E. Scherer
S. Nowak

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
Past	NTA	Walleye, rainbow trout	Sublethal - behavioural
	CO_2	Walleye	" "
	Mercury	Walleye	" "
Present	Fenitrothion	Goldfish, whitefish, walleye, rainbow trout	" "
	Oil drilling mud	Bluefish, cisco rainbow trout	" "
Future	Pesticides	Fish species as above, plus selected invertebrates	" "
	Heavy metals		
	Radionuclides		

* *please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study (see attached example sheet)* *(use another page if necessary)*

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Freshwater Institute
501 University Crescent
Winnipeg, Manitoba
269-7379 (152)

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

J.F. Klaverkamp
R. Danell
B. Everts
S. Harrison
B. Hobden
B. MacDonald
H. Majewski
R. Lillie

Activities (list toxicity studies [past, present, future] undertaken by this lab):

Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
Industrial Effluent Components and Pesticides	Rainbow trout Sockeye salmon Whitefish Walleye Zebrafish	Acute: Lethal flow-through Sublethal: Embryology Reproduction Cardiovascular Respiration Neurochemistry

* please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study
(see attached example sheet) (use another page if necessary)

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Environmental Protection Service
Bioassay Laboratory
14317-128 Ave.
Edmonton, Alberta, T5L 3H3

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

R. H. Weir (Biologist)
W. Lake (Senior Technician)
T. Thackeray (Technician)
A. Holtz (Technician)
B. Moore (contract tech.)
A. Beckett (contract tech.)

Activities (list toxicity studies [past, present, future] undertaken by this lab):

Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
Oil refinery effluent	rainbow trout	lethal-flow through lethal-static
Pulp and paper effluent	" "	lethal-flow through lethal-static
Mining effluent	" "	lethal-flow through lethal static
Oil drilling muds	" "	lethal-static
Oil drilling sumps	" "	lethal-static
Oil drilling components	" "	lethal-static
Smelters	" "	lethal-static
Oil sands	" "	lethal-static
Fertilizer plants	" "	lethal-static
Chemical plants	" "	lethal-static
Domestic sewage	" "	lethal-static
Chlor-Alkali	" "	lethal-static
Various components	" "	lethal-static

* please use following terminology: e.g. lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study

(see attached example sheet) (use another page if necessary)

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

International Pacific Salmon Fisheries Commission
Sweltzer Creek Salmon Research Laboratory
Environment Conservation Division
Cultus Lake, B. C. V0X 1H0

604-858-4612

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

J. A. Servizi
R. W. Gordon
D. W. Martens
K. Warkentin
B. Rannie

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Waste/Contaminant Tested	*Test Organism(s)*	*Bioassay Type* *
Past	- Kraft pulp mill effluent	Sockeye and Pink salmon	Lethal flow through lethal static sub-lethal effects; growth
	- Chlorinated catechols	Sockeye and Pink salmon	Lethal flow through lethal static sub-lethal effects; respiration
	- Decaying Bark	Sockeye eggs, alevins, fry	Lethal flow through sub-lethal effects; emergence tir
	- De-inking mill effluent	Sockeye and Pink salmon	Lethal static sub-lethal effects; respiration
	- Marine bottom sediments	Sockeye salmon	Lethal static
	- Heavy Metal Studies (copper, zinc, cadmium, mercury)	Sockeye and Pink salmon	Lethal static Lethal flow through sub-lethal effects; egg developme and alevin growth
	- 1^{o} and 2^{o} municipal sewage effluent	Sockeye salmon	In-stream bioassays sub-lethal; histology of gills
	- Kraft pulp mill effluent Detoxification by aerated lagoon	Sockeye salmon	Lethal static

* *please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study*

(see attached example sheet) *(use another page if necessary)*

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
Present -	Kraft pulp mill condensates	Sockeye salmon	Lethal static
	- 1° municipal sewage effluent Dechlorinated 1° sewage effluent	Sockeye and Pink salmon	Lethal flow through sub-lethal; histology of gills
Future -	2° municipal sewage effluent	Sockeye salmon	Lethal flow through sub-lethal; histology of gills

* please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study

(see attached example sheet) (use another page if necessary)

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Environment Canada
Environmental Protection Service
Laboratory Services
4160 Marine Drive
West Vancouver, B. C.
V7V 1N6
Phone: 604 - 926 - 2618

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

R. G. WATTS
G. L. Hardaker
L. Thorsen (Miss)

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Waste/Contaminant Tested	Test Animal(s)	Biological Test*
Past & Present	mining effluent	underyearling coho	lethal-static
	pulp and paper effluent	" "	lethal-static
	municipal sewage 1°, 2°	" "	lethal-static
	petrol-chemical effluents	" "	lethal-static
	oils and grease	" "	lethal-static
	pure & processed chemicals	" "	lethal-static
	oil dispersants	" "	lethal-static
	fungacides, herbicides, & pesticides	" " with some rainbow trout	lethal-static
	detergents & cleaning cmpds	underyearling coho	lethal-static
	various light industrial effluents	" "	lethal-static
	various non aqueous products and their leachates	" "	lethal-static
	various streams, ditches etc. both salt and fresh	" "	lethal-static
Future:	all of the above	underyearling coho & rainbow trout	lethal-static & lethal flo through
	suspended solids	underyearling coho	lethal flow through & sublethal effects such as gill abrasion, swimming performance

* please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study

(see attached example sheet) (see another page if necessary)

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Pacific Environment Institute - Fisheries & Marine Service
Environment Canada
4160 Marine Drive
West Vancouver, B.C.
(604) - 922-2211

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

DAVIS, Dr. John C. - Head, Tolerance Biology Section
Greer, Dr. Galen L.
Mason, Ms. B.
Shand, Mr. I.
Levings, Dr. Colin - Benthic Ecology
Rogers, Dr. I. Hal - Pollutant Chemistry

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
Past:	Kraft pulpmill effluent (KME)	sockeye, coho chum, pink salmon	lethal static
	KME	coho	lethal flow-through
	Sodium metaborate	coho	lethal static
	KME	coho, sockeye	sublethal respiration and circulation studies
Present:	KME	coho, sockeye chum, pink	lethal static
	KME	sockeye	lethal flow-through
	dehydroabietic acid	sockeye	sublethal studies of feedir growth, schooling, osmoregu tory ability
	lodgepole pine neutrals and unsaponifiables	chum	lethal static

... /cont'd

* *please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study*

(see attached example sheet) *(use another page if necessary)*

INFORMATION SHEET: Cont'd

Pacific Environment Institute - Fisheries & Marine Service
West Vancouver, B.C.

Activities: Cont'd

	Waste/Contaminant Tested	Test Organism(s)	Bioassay Type
Present: (cont'd)	KME	marine amphipods	lethal static; and subleth. reproductive behaviour tes
	kraft mill receiving waters	coho	on-site sublethal flow-through; swimming performa and avoidance tests
Future:	KME	steelhead	sublethal flow-through swimming performance tests
	KME, resin acids	steelhead, coho	sublethal; olfactory responses, hematology

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Department of the Environment
Pacific Environment Institute
4160 Marine Drive
West Vancouver, B.C. V7V 1N6

Work carried out at Pacific Biological Station, Nanaimo, B.C.

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

WERNER, Arthur E., and ROBINSON, J.

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
Past, Present	Groundwood Pulp fibres (including studies of adaptation, interaction with associated toxicants and drugs)	sockeye salmon	lethal-static

* please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study

(see attached example sheet) (use another page if necessary)

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

B.C. Research
3650 Wesbrook Crescent
Vancouver, B.C. V6S 2L2

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

Dr. D.J. McLeay	Mr. D.A. Brown	Mr. L.J. Hunt
Dr. T.E. Howard	Mr. J.R. Munro	Mr. E. McGreer
Mr. D.J. Bradley	Mr. D.D. Monteith	

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
A.	Bleached kraft pulp mill effluents - mill outfalls process streams 1^{o} and 2^{o} treated kraft mill effluents	Coho salmon	1. Lethal static 2. Lethal flow-through 3. Sublethal - respiration, swimming stamina, temperature tolerance, oxygen uptake, scope for activity biochemicals (clinical profile emphasizing carbohydrate metabolism) studies from 1966 to present.
B.	Contract bioassays for industry - various contaminants including slimicides, pitch dispersants, mine effluents, food processing wastes, sulfite mills, other pulp and paper effluents, deinkers, petroleum refinery wastes, sewage.	Coho salmon Rainbow trout	All lethal static (occasional saltwater test)

... 2

* *please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study*

(see attached example sheet) *(use another page if necessary)*

	Waste/Contaminant Tested	Test Organism(s)	Bioassay Type*
C.	Contract bioassays for government	Coho salmon	Lethal static
	1) 65-35 bioassays of B.C. mills	Coho salmon	Lethal static
	2) B.C. Pollution Control Branch		
D.	Bleached kraft pulp mills	Rainbow trout	Various studies of factors affecting bioassay results
	A - D continuing programs		
E.	Drilling muds (future program)	Amphipods, various salmonids, molluscs	Lethal static
F.	Copper (past program)	Freshwater gastropods, notably B. glabratus	Lethal static Lethal flow-through
		Rainbow trout	Lethal static Lethal flow-through
G.	Other molluscicides	As F	Lethal static

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Fisheries and Marine Service, Pacific Biological Station,
Nanaimo, B. C. V9R 5K6 758-5202

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

ALDERDICE, D. F. .

Activities (list toxicity studies [past, present, future] undertaken by this lab):

Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
DDT, DDD, Malathion, Korlan, Dimethoate, Sevin EC, Sevin M, Phosphamidon, Thuricide	coho and Atlantic salmon juveniles	lethal-static
Kraft mill effluent	sockeye juveniles	lethal-static
Pentachlorophenate	coho juveniles	lethal-static
Low O_2	chum eggs	sublethal-flow through
Sodium arsenite	chum fry	lethal-static
Cadmium	herring eggs, larvae	sublethal-static

* please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study

(see attached example sheet) (use another page if necessary)

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Fisheries and Marine Service, Pacific Biological Station,
Nanaimo, B.C. V9R 5K6 758-5202

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

BRETT, J. R.

Activities (list toxicity studies [past, present, future] undertaken by this lab):

Waste/Contaminant Tested	*Test Organism(s)*	*Bioassay Type* *
Pentachlorophenate	sockeye juveniles	sublethal-flow through
KME	sockeye juveniles	sublethal-static

* *please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study*
(see attached example sheet) *(use another page if necessary)*

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

B. C. Pollution Control Branch
Office: 1106 Cook Street
Victoria, B. C. V8V 4S5
Phone : (Area Code 604) 387-5321

Lab: (on loan from B.C. Fish & Wildlife Branch)
1018 Wharf Street
Victoria, B. C.
(Area Code 604) 387-3564

Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):

Mr. J. C. Arber

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Waste/Contaminant Tested	*Test Organism(s)*	*Bioassay Type* *
Past }	pulp mill effluents	rainbow trout	lethal - static
Present)	mining effluents	rainbow trout	lethal - static (plus on-site caging tests)
	reference toxicants	rainbow trout	lethal - static

Future : ?

NOTE: The B.C. Pollution Control Branch bioassay laboratory has limited facilities, at the present time, for actively performing toxicity studies. The majority of monitoring bioassays required under Provincial permit regulations are undertaken by Permittees and/or consultants.

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* *please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study*

(see attached example sheet) *(use another page if necessary)*

INFORMATION SHEET: LABORATORIES PERFORMING AQUATIC TOXICITY STUDIES

Laboratory (give name of lab, address, telephone number):

Environmental Protection Service
Box 2310
YELLOWKNIFE, N.W.T.
X0E 1H0
403 - 873-3456

*Personnel (name all personnel directly involved with lab; capitalize name(s) of officer(s)-in-charge):**

*Dr. Ron R. Wallace
Mr. Mike Hardon
Mr. J. McComiskey

Activities (list toxicity studies [past, present, future] undertaken by this lab):

	Waste/Contaminant Tested	Test Organism(s)	Bioassay Type *
Future	1) Mine Mill decants (Cn - Zn - Cu)	Aquatic invertebrates	impact-field studies
"	2) Refinery effluent	" "	" " "
"	3) Sewage decants	" "	" " "
Present	*4) Mine mill decants	*S. gairdneri*	lethal-static
"	5) Sump Fluids	algal species	impact-field studies

* work done after sample collections by B. Weir, E.P.S., Edmonton (Regional Bioassay Lab., E.P.S.)

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* *please use following terminology: lethal-static; lethal-flow through; sublethal (+ state kind of measure); impact-field study (see attached example sheet)* *(use another page if necessary)*

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F. Fahmy, Beak Consultants Ltd., Rexdale, Ontario
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P. Budzik, PACE, Ottawa
G. Robins, F&MS, Ottawa
R. Bland, Enviroclean Limited, London, Ontario
P. Paetkau, Alberta Dept. of the Environment, Edmonton
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J. Sprague, Dept. of Zoology, U of Guelph
D. Wright, F&MS, CCIW, Burlington

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Environment Canada | Environnement Canada
Fisheries and Marine | Pêches et sciences de la mer

July 22, 1974

Your file / Votre référence

Our file / Notre référence
1180-1

FINAL PROGRAM FOR THE AQUATIC TOXICITY COORDINATION WORKSHOP

The final program for the Aquatic Toxicity Coordination Workshop is attached. There are several changes in the list of speakers on the 1st day and the titles of the sublethal papers are now listed in the morning session of the 2nd day.

The session on the 1st day is restricted to 15 minute synopses/outlines of the bioassay activities of different laboratories. The sublethal bioassay papers on the 2nd day will be 15 minutes long followed by a 5 minute question period. The afternoon session on acute bioassay methodology will consist of a presentation on each of the five indicated subject areas and a discussion period after each presentation. A slide projector and overhead projector will be available for all sessions. Any slides you may wish to exhibit should be arranged in sequence and presented at the registration desk as early on the day of presentation as possible.

At this time accommodation is still available at the Ramada Inn (1824 Pembina Highway, Winnipeg) for the 18th and 19th of August; however we cannot guarantee the availability of rooms from now on. Lunches will be provided on both days of the Workshop and we have organized a rather unique fish dinner for the evening of the 19th. The cost for the dinner ($6.00/head) should be paid at the registration desk. Tours of the Freshwater Institute have been arranged and information on these will be available at the registration desk.

See you in Winnipeg.

Yours sincerely,

Barry Alexander

D. G. Alexander
Biologist, Aquatic Toxic Studies Division
Resource Management Branch
Central Region

Freshwater Institute
501 University Crescent
Winnipeg, Manitoba
R3T 2N6

Institut des eaux douces
501 University Crescent
Winnipeg, (Manitoba)
R3T 2N6

F4-1000 (4/73)

P R O G R A M

AQUATIC TOXICOLOGY COORDINATION SEMINAR

AUGUST 19, 1974

DAY 1: GENERAL INFORMATION SEMINAR

0830	Registration
0930	Introductory Remarks (Loch)
0945	Environmental Protection Service, Halifax (Pessah)
1000	* * * * * * C O F F E E * * * * * *
1020	Fisheries and Marine Service, Halifax (Farmer)
1035	Noranda Research (Delisle)
1050	Sir George Williams University (Leduc)
1105	Enviroclean Limited (Bland)
1120	Ontario Ministry of the Environment (Boelens)
1135	Environmental Protection Service, Burlington (Cairns)
1150	University of Toronto (Hutchinson)
1205	* * * * * * * L U N C H * * * * * * *
1315	Beak Consultants Limited (Fahmy)
1330	Fisheries and Marine Service, Burlington (Wright)
1345	Pollutech Pollution Advisory Services Limited (Casson)
1400	Fisheries and Marine Service - Operations, Winnipeg (Maciorowski)
1415	Fisheries and Marine Service - Research, Winnipeg (Hamilton)
1430	Fisheries and Marine Service - Research, Winnipeg (Hamilton)
1445	Fisheries and Marine Service - Research, Winnipeg (Brunskill)
1500	* * * * * * C O F F E E * * * * * *
1520	Environmental Protection Service, Edmonton (Weir)
1535	Environmental Protection Service & Fisheries and Marine Service, Vancouver (Cleugh)
1550	Fisheries and Marine Service, Pacific Environment Institute, Vancouver (Greer)
1605	B. C. Research Council (Howard)

P R O G R A M

AQUATIC TOXICOLOGY COORDINATION SEMINAR

AUGUST 20, 1974

DAY 2: SEMINAR ON LETHAL AND SUBLETHAL BIOASSAY METHODS

1st Session: Contributed Papers on Sublethal Bioassays (C. MacLeod, Chairman)

Each paper is 15 minutes followed by a 5 minute question period.

0900 Sublethal Effects of Pulp Mill Effluent (Howard - B.C. Research)

0920 Sublethal Bioassays of Metals and Oil Toxicity (Hutchinson - U of T.)

0940 Avoidance Tests: Approaches, Problems, Results (Scherer - F&MS, Winnipeg)

1000 * * * * * * C O F F E E * * * * * *

1020 Laboratory Experiments on Factors Affecting the Activity of *Gammarus pseudolimnaeus* Bousfield - A Behavioural Bioassay? (Wallace - EPS, Yellowknife)

1040 Monitoring Fish Respiration by Use of Electrode Chambers (Boelens - Ontario MOE)

1100 Effects of Sublethal Concentrations of Cyanide on Reproduction in Immature Rainbow Trout (Ruby - Sir George Williams)

1120 Some Uses and Limitations of Biochemical Pathology in Fish (Lockhart - F&MS, Winnipeg)

1140 Discussion Session on Sublethal Papers

1200 * * * * * * * L U N C H * * * * * * *

2nd Session: Presentation and Discussion of Acute Bioassay Topics (E. Pessah, Chairman)

1300 Effluent Handling and Storage (Weir)

1330 Care and Handling of Fish Stocks (Alexander)

1400 Bioassay Test Procedures (Howard)

1500 * * * * * * C O F F E E * * * * * *

1520 On Site vs. Laboratory Testing (Craig)

1550 Salt-Water Bioassays (Farmer)

WATER POLLUTION RESEARCH LABORATORY

DEPARTMENT OF BIOLOGICAL SCIENCES

SIR GEORGE WILLIAMS UNIVERSITY

MONTREAL

The research of this laboratory is primarily aimed at the formulation of water quality criteria meeting the ecophysiological requirements of aquatic organisms.

Current projects bear mainly on the chronic effects of industrial pollutants and insecticides on fish. The chemicals presently under study are cyanide, xanthates, arsenic and methoxychlor of which the effects are measured on growth, respiration, swimming ability, gonadal development, histopatology and enzymology.

Ongoing Studies:

1. Faculty and research associates:

   Anderson, P., Assistant Professor. Multiple toxicity studies on fish.

   Leduc, G., Associate Professor. Chronic effects of cyanide on developing salmon embryos.

   Ruby, S., Assistant Professor. Effects of cyanide on spermatogenesis in fish.

   Leduc, G. and S. Ruby. Effects of cyanide on gonadal development and reproduction of zebra fish.

   Ruber, H., Research Associate. Acute and sublethal toxicity of xanthates on rainbow trout.

   Webb, M., Research Associate. Histopathological effects of xanthates on rainbow trout.

2. Graduate students (M.Sc.)

   Cormier, E. An approach to the study of the sub-lethal effects of toxicants on fish tissues and organs through the quantitative analysis of certain serum enzymes.

   Dixon, G. Chronic effects of cyanide on growth and respiration of rainbow trout; quantitative histopathological effects.

Lesniak, J. Effects of cyanide on ovogenesis in rainbow trout.

Spears, P. The toxicity of environmental contaminants as a quantitative function of body weight.

Speyer, M. Combined effects of arsenic and cyanide on growth, swimming and respiration of rainbow trout.

Future Projects :

The orientation of this research group will remain essentially the same; laboratory studies of aquatic toxicology. We however, anticipate to enlarge the scope of our studies to include organisms other than fish. We expect one new faculty position in this area; new space and improved services (water supply, heating and cooling), which should be completed shortly and will allow a greater number of graduate students to work in much better conditions.

Presented by G. Leduc at the Aquatic Toxicology Coordination Seminar, Winnipeg, August 19-20, 1974.